AWARD/CONTRACT	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE OF PAGES 1 | 2

2. CONTRACT (Proc. Inst. Ident.) NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQUEST/PROJECT NO.
EP-C-17-031/68HERC19F0007	See Block 20C	PR-ORD-18-02145

5. ISSUED BY	CODE	6. ADMINISTERED BY (If other than Item 5)	CODE
CAD	CAD		

CAD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: W136
Cincinnati OH 45268-0001

SCD-C

7. NAME AND ADDRESS OF CONTRACTOR (No., street, country, State and ZIP Code)	8. DELIVERY	9. DISCOUNT FOR PROMPT PAYMENT
TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030	☐ FOB ORIGIN ☒ OTHER (See below)	

CODE 198549560	FACILITY CODE	10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN	ITEM

11. SHIP TO/MARK FOR	CODE	12. PAYMENT WILL BE MADE BY	CODE
CAD	CAD	RTP FMC	

CAD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: W136
Cincinnati OH 45268-0001

RTP Finance Center
US Environmental Protection Agency
RTP-Finance Center (AA216-01)
109 TW Alexander Drive
www2.epa.gov/financial/contracts
Durham NC 27711

13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION:	14. ACCOUNTING AND APPROPRIATION DATA
☐ 10 U.S.C. 2304 (c) ( ) ☒ 41 U.S.C. 3304 (a) ( )	See Schedule

15A. ITEM NO	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
	Continued				
	15G. TOTAL AMOUNT OF CONTRACT				$124,988.00

16. TABLE OF CONTENTS

(X)	SEC.	DESCRIPTION	PAGE(S)	(X)	SEC.	DESCRIPTION	PAGE(S)
		PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES	
	A	SOLICITATION/CONTRACT FORM			I	CONTRACT CLAUSES	
	B	SUPPLIES OR SERVICES AND PRICES/COSTS				PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.	
	C	DESCRIPTION/SPECS./WORK STATEMENT			J	LIST OF ATTACHMENTS	
	D	PACKAGING AND MARKING				PART IV - REPRESENTATIONS AND INSTRUCTIONS	
	E	INSPECTION AND ACCEPTANCE			K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
	F	DELIVERIES OR PERFORMANCE					
	G	CONTRACT ADMINISTRATION DATA			L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
	H	SPECIAL CONTRACT REQUIREMENTS			M	EVALUATION FACTORS FOR AWARD	

CONTRACTING OFFICER WILL COMPLETE ITEM 17 (SEALED-BID OR NEGOTIATED PROCUREMENT) OR 18 (SEALED-BID PROCUREMENT) AS APPLICABLE

17. ☒ CONTRACTOR' S NEGOTIATED AGREEMENT (*Contractor is required to sign this document and return* _____ *copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. *(Attachments are listed herein.)*

18. ☐ SEALED-BID AWARD (*Contractor is not required to sign this document.*) Your bid on Solicitation Number _____, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your bid, and (b) this award/contract. No further contractual document is necessary. (Block 18 should be checked only when awarding a sealed-bid contract.)

19A. NAME AND TITLE OF SIGNER (Type or print)	20A. NAME OF CONTRACTING OFFICER
	Mark Cranley

19B. NAME OF CONTRACTOR	19C. DATE SIGNED	20B. UNITED STATES OF AMERICA	20C. DATE SIGNED
BY _____ *(Signature of person authorized to sign)*		BY _____ ELECTRONIC SIGNATURE *(Signature of the Contracting Officer)*	10/09/2018

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STANDARD FORM 26 (Rev. 3/2013)
Prescribed by GSA - FAR (48 CFR) 53.214(a)

NAME OF OFFEROR OR CONTRACTOR

TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	DUNS Number: 198549560 FFP TO Stream and Lake Regional Monitoring Networks Assistance and IDF Curve Development for BMPs Fully funded at the time of award TOCOR: Britta Bierwagen Max Expire Date: 03/31/2020 Delivery: 03/31/2020 Accounting Info: 18-19-C-262W000-000FK6XR1-2532-26A5C-18262WC812-00 1 BFY: 18 EFY: 19 Fund: C Budget Org: 262W000 Program (PRC): 000FK6XR1 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 18262WC812-001 Period of Performance: 10/10/2018 to 03/31/2020 Technical Support for NCEA's Ecological Risk Assessment Programs				
0001	Task Order Issuance Line Item: Technical Support for EPA/ORD/NCEA's Ecological Assessment Programs				124,988.00
	Delivery-Invoice Payment Schedule shall not exceed a frequency greater than once a month and 90% of the task order price. Acceptance for invoicing is based on deliverable approval by the TOCOR. For efficient processing IAW FAR clause 52.232-32, performance based payment invoicing amounts will not be submitted until the TOCOR provides deliverable approval. The TOCOR will notify Tetra Tech within 14 days of submission of a deliverable of EPAs intention to approve or disapprove. TOCOR: Britta Bierwagen/(202)564-7676/bierwagen.britta@epa.gov ALTOCOR: Thomas Johnson/(202)564-6677/johnson.thomas@epa.gov				

PERFORMANCE WORK STATEMENT
EP-C-17-031
PR-ORD-18-02145
TO # 68HERC19F0007

TITLE: Stream and Lake Regional Monitoring Networks Assistance and IDF Curve Development for BMPs

EAS Short Title: RMNs Assistance and IDF Curves

Task Order COR (TOCOR)	**Alternate Task Order COR (ATOCOR)**
Name: Britta Bierwagen	Name: Thomas Johnson
Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460	Office: ORD/NCEA/GCRP 1200 Pennsylvania Ave., NW (MC 8601P) Washington, DC 20460
Phone: 202-564-7676	Phone: 202-564-6677
Email: Bierwagen.Britta@epa.gov	Email: Johnson.thomas@epa.gov

PERIOD OF PERFORMANCE: Date of Task Order award through 18 months following award

NCEA's Exposure Analysis and Risk Characterization Group

The National Center for Environmental Assessment's (NCEA's) Exposure Analysis and Risk Characterization Group (EARCG) within EPA's Office of Research and Development assesses complex environmental issues to inform and improve the next generation of environmental decisions. EARCG uses the best available science to inform management and policy decisions through innovative synthesis, assessment, and research to fill critical knowledge gaps by working with stakeholders and partners to identify and address both near- and long-term challenges associated with a changing environment. EARCG addresses scientific issues that focus on the impacts from local and global stressors to ecosystems and resources, water quality and drinking water, air quality, human health and well-being, and assessments of the impacts of potential response strategies. Of particular interest are assessments of the potential vulnerability of aquatic ecosystems to a variety of long-term stressors, including land use change, changes to biogeochemical cycles, hydrologic changes, and climatic changes, in order to inform state, tribal and regional restoration and resilience efforts.

BACKGROUND

The EARCG has worked with EPA's Office of Water, the Regions, states, and tribes to build capacity in long-term monitoring, deployment of continuous sensors, and development of suitable indicators to detect long-term trends. This work has led to the development of Regional Monitoring Networks in Regions 1-7 in streams, Regions 1, 2 and 5 in lakes, and Region 3 in wetlands. The initial focus is on long-term monitoring of least-disturbed sites near headwaters. Workshops, webinars, and other presentations have led to subsequent interest by other regions and programs to conduct similar vulnerability assessments that support the development of monitoring networks to detect long-term trends in aquatic ecosystems.

Urban runoff is a key source of impairment of waterbodies in developed areas. Best Management Practices (BMPs) are used to control and treat urban runoff, including both gray (engineered) and green (plant and soil-based) practices. In past work, EPA developed a *Qualitative Analysis of Climate Change and Performance of Agricultural and Urban BMPs (Contract EP-C-12-060; TO 4-13).* This identified the physical and ecosystem based factors that control BMP performance and provided a qualitative analysis of the vulnerability, flexibility, and adaptation potential of different types of BMPs. This analysis suggested that urban BMPs are especially vulnerable to changes in rainfall patterns. EPA also undertook quantitative modeling studies using the RHESSys and SUSTAIN models to examine aspects of urban BMP performance under different climate regimes (Contract EP-C-12-060; TO 4-13). Those quantitative analyses are not, however, readily extrapolatable to provide needed answers at locations throughout the U.S., as identified in the qualitative analysis.

Both gray and green BMPs need to be sized to control a high fraction of storm runoff to achieve desired results. Sizing depends on the expected intensity (I), duration (D), and frequency (F) of storm (rainfall) events. Understanding how IDF curves may change under future conditions is a key factor in analyzing vulnerability and resilience of BMP systems. If IDF characteristics are incorrectly specified or change, design guidelines can be inadequate. As part of the ongoing *Synthesis Report: BMP Resilience under Changing Conditions (Contract EP-C-17-031; TO-3)*, the contractor refined and presented an efficient method for updating NOAA Atlas 14 IDF curves with climate data using an Equidistant Quantile Mapping approach. The method is largely, but not completely automated in Python code.

PURPOSE OF THIS TASK ORDER (TO)

This task order builds on previously completed products, providing information supporting RMN methods, development, and analysis and adaptation planning in a format directly compatible with existing to stormwater management design practices, i.e., that can be used to translate anticipated changes in IDF curves into changes in BMP performance and sizing requirements.

DESCRIPTION OF TASKS

Task 1: Communication and QAPP development

SubTask 1.1. Communication and Regular Reporting

The contractor shall schedule weekly project meetings throughout the period of performance of this Task Order.

> *Task 1.1 Deliverable 1.1:* Weekly conference calls to provide status updates. Due each week for the duration of this TO.

SubTask 1.2. Develop QAPP

All work conducted under this task order shall be performed pursuant to an EPA-approved Quality Assurance Project Plan (QAPP). The QAPP shall be submitted for review and approval by the TOCOR and the EPA QA Officer 14 days after TO award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this TO relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this TO relevant to geospatial data will reference *Guidance for*

Quality Assurance Project Plans for Geospatial Data (EPA QA/G-5G). Elements from these sources will be used to derive a single QAPP for this TO.

All electronic deliverables (i.e., computer files) shall be submitted in a format acceptable to EPA.

Tasks 2 through 8 may not begin until receiving in writing from the EPA TOCOR that EPA has approved the QAPP.

Task 1.2 Deliverable 1.2.A: QAPP submitted to the TOCOR for review 14 days after TO award.

Task 1.2 Deliverable 1.2.B: Final QAPP addressing TOCOR's and QA officer's comments on the QAPP due one (1) week after receiving comments.

Task 2: Develop Lake and Stream Protocols Documents

Previous work under TO-002 (EP-C-17-031) developed a report assessing methods to use in regional monitoring network of lakes. States and tribes need protocol documents based on these methods that they can use in the field and to share with other partners. Stream RMN partners also have a need for protocol documents based on the shared QAPP.

SubTask 2.1. Five lake protocol documents

Lake RMN partners are interested in five lake protocol documents: vertical profile, water chemistry, ice cover, water level and general assessment form. Format should be compatible with tablets used in the field (e.g., iPad) and printable in as concise a manner as possible.

Task 2.1 Deliverable 2.1.A: Submit draft protocol documents to TOCOR and lake RMN partners for review and hold webinar to get feedback from lake RMN partners due 4 weeks after QAPP approval.

Task 2.1 Deliverable 2.1.B: Address comments from TOCOR and lake RMN partners, finalize documents, distribute to lake RMN partners, and hold webinar due 2 weeks after receiving approval for TOCOR on Deliverable 2.1.A.

SubTask 2.2. Six stream protocol documents

Stream RMN partners are interested in six stream protocol documents: continuous temperature sensors; continuous water level sensors; macroinvertebrates for the Northeast, Mid-Atlantic, and Southeast; fish for R5.; six documents: continuous temperature sensors; continuous water level sensors; macroinvertebrates - Northeast, MidAtlantic, Southeast; fish for R5. Format should be compatible with tablets used in the field (e.g., iPad) and printable in as concise a manner as possible.

Task 2.2 Deliverable 2.2.A: Submit draft protocol documents to TOCOR and appropriate contacts in each region for review 6 weeks after QAPP approval.

Task 2.1 Deliverable 2.2.B: Address comments from TOCOR and stream RMN partners, finalize documents, distribute to stream RMN partners, and hold webinar due 2 weeks after receiving approval for TOCOR on Deliverable 2.2.A.

Task 3: RMN Continuous Data Management

The existing R scripts and R Shiny application are important tools for RMN partners to manage the continuous data collected from temperature and flow sensors. Partners require support to ensure that these tools work for their sensors and IT environments. The tools also require periodic updating based on partner feedback and other needs.

SubTask 3.1. Continuous data management support

The contractor shall assist partners with the use of R scripts and the R Shiny application to manage the continuous data collected as part of the RMNs.

Task 3.1 Deliverable 3.1: Monthly memo describing assistance to partners or tool improvements due to TOCOR at the end of each month for duration of the TO.

SubTask 3.2. Continuous data management for lake RMNs

The lake RMNs are installing continuous sensors and require training on data management to ensure consistency across partners. Additionally, vertical profile data is unique to lakes and partners require support to analyze these data. The Contractor shall hold a webinar to discuss sensor configuration and develop an R script to generate vertical profile graphics.

Task 3.2 Deliverable 3.2.A: All-region webinar with tips for configuring sensors for lakes, file naming and formatting and managing continuous vertical profile data. Due 4 weeks after QAPP approval.

Task 3.2 Deliverable 3.2.B: Develop R script for continuous vertical profile graphics. Due 8 weeks after Deliverable 3.2.A.

Task 3.2 Deliverable 3.2.C: Hold training webinar on Deliverable 3.2.B. Due 2 weeks after receipt of comments from TOCOR.

SubTask 3.3. Continuous data management for stream RMNs

Stream RMN partners have submitted continuous sensor data and require additional assistance interpreting results and performing QC checks. The contractor shall format, QC and summarize the data files from RMN partners and hold an all-region webinar to discuss findings.

Task 3.3 Deliverable 3.3.A: Format, QC and summarize the continuous data files obtained from the Eastern RMN partners last year. Summary of findings due to TOCOR 3 months after QAPP approval.

Task 3.3 Deliverable 3.3.B: Hold all-region webinar to go over findings from Deliverable 3.3.A. Due 2 weeks after TOCOR approval of Deliverable 3.3.A.

Task 3.3 Deliverable 3.3.C: Hold training webinar, primarily for Midwest RMN partners, on formatting, QCing and summarizing continuous data files. Due 6 weeks after QAPP approval.

Task 4: Stream RMN Biological Data Analysis

Stream RMNs have been collecting benthic macroinvertebrate data as part of their annual sampling. However, there remains taxonomic variability among states that needs to be reconciled in order to calculate RMN-wide metrics. The contractor shall customize an R script for calculating biological metrics, hold a training webinar and gather partner input on thermal and hydrological trait assignments.

Deliverable 4.A: Customize R script for calculating biological metrics for RMNs. Due 4 months after QAPP approval.

Deliverable 4.B.: Hold webinar to demonstrate use of R scripts that calculate biological metrics and allow rarification of samples. Due 2 weeks after Deliverable 4.A.

Deliverable 4.C.: In each region, solicit feedback on macroinvertebrate nomenclature and attribute/trait assignments to determine the best thermal and hydrologic indicators; identify discrepancies in nomenclature and make required updates to the taxonomy. Submit memo to TOCOR on findings. Due 2 months after QAPP approval.

Deliverable 4.D.: Hold an all-region webinar to discuss Deliverable 4.C and recommend a strategy for addressing the issues. Due 2 weeks after Deliverable 4.C.

Task 5: Articles Based on R10 BCG Development

TO-002 on this contract worked with OW/OST, R10, Oregon and Washington to include thermal and hydrologic traits in the BCG development. This work led to outlines for two journal articles describing how the BCG, IWI, and ICI could be used together to inform protection and restoration activities and how this approach could be used in the context of long-term resilience considerations.

SubTask 5.1. Article on BCG, IWI, and ICI approach to inform protection and restoration

The contractor shall finalize the article initiated under TO-002 with the co-authors from the R10 BCG workshop.

Deliverable 5.1.A: Address co-author comments on current draft of article and circulate 2nd draft for co-author input. Due 7 weeks after QAPP approval.

Deliverable 5.1.B: Address co-author comments on 2nd draft and submit internal review draft to TOCOR and co-authors. Due 3 weeks after Deliverable 5.1.A.

Deliverable 5.1.C: Address internal review comments and submit to TOCOR for EPA clearance. Due 4 weeks after Deliverable 5.1.B.

Deliverable 5.1.D: Submit article to journal. Due 1 week after receiving TOCOR approval (i.e., EPA clearance) of Deliverable 5.1.C.

Deliverable 5.1.E: Address journal article review comments and finalize submission for journal. Due 3 weeks after receipt of comments from journal.

SubTask 5.2. Article on long-term resilience considerations to protection and restoration

The contractor shall build on the article in subtask 5.1 to incorporate long-term resilience considerations into the approach. This integrates the vulnerability assessment results from TO-002 into the approach above to examine the resilience of potential restoration and protection sites.

Deliverable 5.2.A: Revise outline from TO-002 and TOCOR comments and share with co-authors. Due 4 weeks after Deliverable 5.1.B.

Deliverable 5.2.B: Develop 1st draft based on co-author input and circulate to TOCOR and co-authors for comments. Due 8 weeks after Deliverable 5.2.A.

Deliverable 5.2.C: Revise 1st draft based on TOCOR and co-author comments and submit internal review draft to TOCOR. Due 4 weeks after Deliverable 5.2.B.

Deliverable 5.2.D: Address internal review comments and submit revised draft to TOCOR for EPA clearance. Due 4 weeks after receiving internal review comments.

Task 6: Maps and Analyses for Classification Article

The Contractor shall develop maps and assist with additional analyses for the classification article from Task 7, TO-002 on this contract that are now needed based on revised analyses done by the lead author.

Deliverable 6.A: Assist with additional analyses to finalize the results of the classification article. Due 6 weeks after receipt of data from lead author.

Deliverable 6.B: Develop maps of results for classification article. Due 3 weeks after receipt of data.

Task 7: Meeting support and webinar/conference calls with RMN leads and partners

The Contractor shall assist with meeting support and workshop planning (e.g., National Water Quality Monitoring Conference, SWPBA, NEAEB, AMAAB, SFS) to bring RMN partners together for training and peer-to-peer learning regarding RMN implementation, methods, data

management, and data analysis. The Contractor also shall support RMN partners and RMN Regional leads to ensure peer-to-peer exchanges and consistency within and across RMNs (up to 5 hours per month). This task builds on work in Tasks 3 (subtasks 3.2 and 3.3) and 4.

> *Deliverable 7*: Monthly memo describing support activities and summarizing conference call or webinar discussions with RMN partners and RMN Regional leads. Due to TOCOR monthly.

Task 8: **Develop and link anticipated changes in IDF curves to changes in BMP performance and sizing**

In consultation with the TOCOR, the Contractor shall develop and demonstrate the use of a tool to take precipitation series from IDF curve information and generate event (stormwater) runoff. To address the problem in cost-efficient manner, simple modeling tools will be used that focus on runoff from highly impervious drainages and the interaction of runoff with BMP storage volume (e.g., FAA IDF-based detentions sizing method, or EPA's Stormwater Calculator). BMP capacity will be based on a capture volume target and typical rate of recovery (controlled release rate for detention ponds, rate of infiltration for bioretention, etc.). The simple model will be iterated over a range of percentage capture volume targets and IDF characteristics to determine the relationship between treatment and bypassed flow fractions and the IDF inputs (e.g., simulations performed for combinations of durations and intensities; repeated at multiple levels of effective impervious area). Analyses will be performed for detention basins, bioretention, and green roof BMPs. Results will be used to develop a nomograph or other mathematical approximation of storage volume (per unit drainage area) estimates for each BMP type, each effective impervious area level, and each frequency level (e.g., 10-yr recurrence) that expresses the dependence of required volume on intensity and duration. The nomograph (or other mathematical approximation) shall be developed in a format suitable for distribution to practitioners in the Regions and States seeking guidance on climate resilient BMP design. The tool shall include concise, clearly written user-support information describing the applicability and use of the tool.

In addition, as part of the ongoing *Synthesis Report: BMP Resilience under Changing Conditions*, the contractor refined and presented an efficient method for updating NOAA Atlas 14 IDF curves with climate data using an Equidistant Quantile Mapping approach. The Contractor shall apply this method to 20 cities in the Atlas 14 coverage area (i.e., excluding Texas and the Pacific Northwest) using three different climate scenarios (dry, mid, and wet) based on mid-century climate model projections. Using the analysis of BMP sensitivity described above, the Contractor shall develop a draft manuscript discussing the implied range of change in BMP sizing requirements for each example location, and documenting the methodology such that it can be performed for other sites. The manuscript shall be written in clear, concise prose consistent with the standards of peer reviewed scientific literature (e.g., suitable for publication in technical journals such as the Journal of the American Water Resources Association). After receiving TOCOR comments on the draft, the Contractor shall revise the manuscript to address all comments, and submit a final draft suitable for submittal to a journal for publication.

> *Deliverable 8.A*: Design memo describing proposed approach to complete Task 8. Due for TOCOR approval 1 month after award.

Deliverable 8.B: Draft tool with user support for TOCOR review. Due 6 months after approval of Deliverable 8.A.

Deliverable 8.C: Final tool with user support for use by practitioners. Due 1 month after receiving TOCOR comments on Deliverable 8.B.

Deliverable 8.D: Draft manuscript for TOCOR review. Due 8 months after approval of Deliverable 8.A.

Deliverable 8.E: Final manuscript for use by practitioners. Due for TOCOR review 1 month after receiving comments on Deliverable 8.D.

SCHEDULE OF BENCHMARKS & DELIVERABLES:

Task No.	SubTask No.	DELIVERABLE	Incremental Schedule
1	**1.1**	**1.1.** Weekly conference calls	Due each week for the duration of this TO.
1	**1.2**	**1.2.A.** QAPP	Due 14 days after TO award.
1	**1.2**	**1.2.B.** Revised QAPP	Due 1 week after TOCOR comments
2	**2.1**	**2.1.A.** Draft lake protocol documents	Due 4 weeks after QAPP approval
2	**2.1**	**2.1.B.** Final lake protocol documents and webinar	Due 2 weeks after receiving comments on 2.1.A.
2	**2.2**	**2.2.A.** Draft stream protocol documents	Due 6 weeks after QAPP approval
2	**2.2**	**2.2.B.** Final stream protocol documents and webinar	Due 2 weeks after comments on Deliverable 2.2.A.
3	**3.1**	**3.1.A.** Monthly memo describing R tool assistance	Due monthly
3	**3.2**	**3.2.A.** Webinar on lake sensor configurations	Due 4 weeks after QAPP approval
3	**3.2**	**3.2.B.** R script for vertical profile graphics	Due 8 weeks after Deliverable 3.2.A
3	**3.2**	**3.2.C.** Webinar on R script	Due 2 weeks after TOCOR comments
3	**3.3**	**3.3.A.** Eastern RMN continuous data summaries	Due 3 months after QAPP approval
3	**3.3**	**3.3.B.** Webinar on findings	Due 2 weeks Deliverable 3.3.A
3	**3.3**	**3.3.C.** Training webinar on continuous data management	Due 6 weeks after QAPP approval

4	**4**	**4.A.** Biological metrics R script	Due 4 months after QAPP approval
4	**4**	**4.B.** Webinar on R scripts	Due 2 weeks after Deliverable 4.A
4	**4**	**4.C.** Memo on macroinvertebrate nomenclature and traits	Due 2 months after QAPP approval
4	**4**	**4.D.** Webinar on Deliverable 4.C	Due 2 weeks after Deliverable 4.C
5	**5.1**	**5.1.A.** 2nd draft of article	Due 7 weeks after QAPP approval
5	**5.1**	**5.1.B.** Internal review draft	Due 3 weeks after Deliverable 5.1.A
5	**5.1**	**5.1.C.** Draft for clearance	Due 4 weeks after Deliverable 5.1.B
5	**5.1**	**5.1.D.** Submit to journal	Due 1 week after Deliverable 5.1.C
5	**5.1**	**5.1.E.** Final article	Due 3 weeks after Deliverable 5.1.D.
5	**5.2**	**5.2.A.** Revised outline	Due 4 weeks after deliverable 5.1.B
5	**5.2**	**5.2.B.** 1st draft article	Due 8 weeks after Deliverable 5.2.A
5	**5.2**	**5.2.C.** Internal review draft	Due 4 weeks after Deliverable 5.2.B
5	**5.2**	**5.2.D.** Clearance draft	Due 4 weeks after receipt of internal review comments
6	**6**	**6.A.** Additional analyses	Due 6 weeks after receipt of data from lead author
6	**6**	**6.B.** Maps	Due 3 weeks after receipt of data
7	**7**	**7.** Memo	Monthly
8	**8**	**8.A.** Design memo	Due 1 month after award
8	**8**	**8.B.** Draft tool	Due 6 months after 8.A
8	**8**	**8.C.** Final tool	Due 1 month after receiving comments on 8.B
8	**8**	**8.D.** Draft manuscript	Due 8 months after 8.A
8	**8**	**8.E.** Final manuscript	Due 1 month after receiving comments on 8.D

REPORTING

All documentation and reporting under this TO shall be in compliance with contract requirements. See contract clause F.3, F.4, and J.1 "List of Documents, Exhibits and Other Attachments, Number 2 - Reports of Work".

Additional requirements specific to this TO are as follows:

Electronic deliverables must be in an original file format that can be supported by EPA after the end of the Period of Performance of the TO. The standard office software at EPA is MS Office. The standard GIS software at EPA is ESRI ArcGIS.

TRAVEL
Travel is anticipated for no more than 4 conferences or regional biologists meetings under Task 7.

CONTRACTOR IDENTIFICATION
Contractor personnel shall always identify themselves as Contractor employees by name and organization and physically display that information through an identification badge. Contractor personnel are prohibited from acting as the Agency's official representative.

The Contractor shall refer any questions relating to the interpretation of EPA policy, guidance, or regulation to the TOCOR.

TECHNICAL DIRECTION

The TOCOR is authorized to provide technical direction that clarifies the performance work statement (PWS) as set forth in this task order. Before initiating any action under technical direction, the contractor shall ensure that the technical direction falls within the scope of work for this task order. The technical direction shall be issued in writing by the TOCOR within four working days of verbal issuance. This will be forwarded to the CL-COR and CO for their information and necessary actions. The CO is the only individual authorized to make changes to this task order or contract. Any changes to the scope of work must be issued by the CO via modification to the task order or contract. Technical direction includes direction to the contractor that assists the contractor in accomplishing individual tasks deemed appropriate under the PWS, as well as comments and approval of reports and other deliverables.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
P00001	See Block 16C	PR-ORD-20-01462	

6. ISSUED BY	CODE	7. ADMINISTERED BY *(If other than Item 6)*	CODE
CAD	CAD		

CAD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: W136
Cincinnati OH 45268-0001

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

TETRA TECH, INC.
Attn: George Townsend
10306 EATON PL STE 340
FAIRFAX VA 22030

CODE 198549560 FACILITY CODE

(x) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED *(SEE ITEM 11)*

x 10A. MODIFICATION OF CONTRACT/ORDER NO.
EP-C-17-031
68HERC19F0007

10B. DATED *(SEE ITEM 13)*
10/09/2018

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended. ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended , by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted ; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted , such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*
See Schedule

Net Decrease: -$3,550.00

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation data, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER *(Specify type of modification and authority)* Bilateral Agreement to De-Ob Remaining Balance and Closeout Task Order

E. IMPORTANT: Contractor ☐ is not ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

DUNS Number: 198549560
TOCOR: Britta Bierwagen Max Expire Date: 03/31/2020
LIST OF CHANGES:
Reason for Modification: Other Administrative Action - Bilateral Agreement to De-Ob Remaining/Unpaid Balance and Confirm Deliverable Receipt for Full Task Order Closeout
Total Amount for this Modification: -$3,550.00
New Total Amount for this Version: $121,438.00
New Total Amount for this Award: $121,438.00
Obligated Amount for this Modification: -$3,550.00
New Total Obligated Amount for this Award: $121,438.00

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
		Andrea Dehne	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		ELECTRONIC SIGNATURE *(Signature of Contracting Officer)*	07/24/2020

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	CHANGES FOR LINE ITEM NUMBER: 1 Total Amount changed from $124,988.00 to $121,438.00 Obligated Amount for this Modification: -$3,550.00 CHANGES FOR DELIVERY LOCATION: CAD Amount changed from $124,988.00 to $121,438.00 CHANGES FOR ACCOUNTING CODE: 18-19-C-262W000-000FK6XR1-2532-26A5C-18262WC812-00 1 Amount changed from $124,988.00 to $121,438.00 Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711 Period of Performance: 10/10/2018 to 03/31/2020 Delivery-Invoice Payment Schedule shall not exceed a frequency greater than once a month and 90% of the task order price. Acceptance for invoicing is based on deliverable approval by the TOCOR. For efficient processing IAW FAR clause 52.232-32, performance based payment invoicing amounts will not be submitted until the TOCOR provides deliverable approval. The TOCOR will notify Tetra Tech within 14 days of submission of a deliverable of EPAs intention to approve or disapprove. TOCOR: Britta Bierwagen/(202)564-7676/bierwagen.britta@epa.gov ALTOCOR: Thomas Johnson/(202)564-6677/johnson.thomas@epa.gov				